Docket No.: GROTH 3.3-036
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Hans-Olof Backlund

Application No.: 10/509,981

Group Art Unit: 2822

Filed: April 22, 2005

Examiner: D. E. Graybill

For: A METHOD AND A DEVICE FOR MEASURING STRESS FORCES IN REFINERS

APPEAL BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

Applicant hereby files this Appeal Brief in response to the final rejection of claims 22, 24-32, and 34-42 mailed December 13, 2007, and to the Advisory Action mailed May 15, 2008, along with a four-month petition for extension of time.

TABLE OF CONTENTS

PAGE

I. **REAL PARTY IN INTEREST**

The real party in interest is Metso Paper, Inc., the assignee of record, which is a corporation of Finland having a mailing address at Box 1220, FIN-00101 Helsinki, Finland.

II. **RELATED APPEALS AND INTERFERENCES**

No prior or pending appeals, judicial proceedings, or interferences are known to be related to, directly affect, or be directly affected by, or have a bearing on, the Board's decision in the pending appeal.

III. **STATUS OF CLAIMS**

Claims 1-21, 23, and 33 are canceled.

Claims 22, 24-32, and 34-42 are rejected and are the subject of the present appeal.

IV. **STATUS OF AMENDMENTS**

No amendments have been filed subsequent to the final rejection mailed December 13, 2007.

V. **SUMMARY OF CLAIMED SUBJECT MATTER**

Claims 22 and 30 are independent claims. All specification references below are to the clean copy version of the substitute specification filed in the preliminary amendment dated October 4, 2004.

The subject matter of independent claim 22 relates to a method of measuring stress forces in refiners. The refiners include a pair of refining discs juxtaposed with each other and forming a refining gap for refining material therebetween (*see, e.g.*, p.1 ¶ 0002 ll.2-7). The pair of refining discs includes at least one refining surface including a plurality of bars (*e.g.*, bars 3 in FIG. 1) for refining the material within the refining gap (*see, e.g.*, p.1 ¶ 0002 ll.8-12). The refining

surface includes a measuring surface (*e.g.*, measuring surface 2 in FIG. 1). The measuring surface comprises a predetermined portion of the refining surface, including at least a portion of at least a pair of said plurality of bars (*see*, *e.g.*, p.10 ¶ 0037 ll.3-5 and FIG. 2, where measuring surface 2 includes a portion of at least a pair of bars 6). The method comprises resiliently mounting the measuring surface in the refining surface (*see*, *e.g.*, FIGS. 1, 3, and 5, illustrating measuring surface 2 mounted in refining segment 1 having a refining surface) and simultaneously measuring both the magnitude and direction of stress forces in the plane of said measuring surface (*see*, *e.g.*, p.12 ¶ 0045 l.19 through p.13 l.4). Said "simultaneously measuring" comprises measuring the stress forces in a first direction by means of a first force sensor (*e.g.*, measuring the stress forces in the X-direction or the Y-direction, as illustrated in FIG. 4, by means of a pair of sensors 12 or 22 arranged opposite one another, as shown in FIG. 7 and as described on p.12 ¶ 0045 ll.5-22 and p.13 ¶ 0046 ll.7-15) and measuring the stress forces in a second direction by means of a second force sensor (*e.g.*, measuring the stress forces in another direction by means of another pair of sensors 12 or 22 arranged opposite one another), said first direction being angularly displaced with respect to said second direction (*see*, *e.g.*, p.12 ¶ 0045 ll.8-9). Said "simultaneously measuring" also comprises determining the magnitude and direction of the stress forces by measuring the stress forces in said first and second directions (*see*, *e.g.*, p.13 ll.2-4).

The subject matter of independent claim 30 relates to an apparatus for measuring stress forces in refiners. The apparatus includes a pair of refining discs juxtaposed with each other and forming a refining gap for refining material therebetween (*see*, *e.g.*, p.1 ¶ 0002 ll.2-7). The pair of refining discs includes at least one refining surface including

a plurality of bars (*e.g.*, bars 3 in FIG. 1) for refining the material within the refining gap (*see*, *e.g.*, p.1 ¶ 0002 ll.8-12). The refining surface includes a stress measuring member (*e.g.*, measuring device 4 in FIG. 1). The stress measuring member comprises a measuring surface (*e.g.*, measuring surface 2 in FIG. 1), which comprises a predetermined portion of the refining surface, including at least a portion of at least a pair of said plurality of bars (*see*, *e.g.*, p.10 ¶ 0037 ll.3-5 and FIG. 2, where measuring surface 2 includes a portion of at least a pair of bars 6). The stress measuring member is resiliently mounted in the refining surface (*see*, *e.g.*, FIG. 1 illustrating measuring device 4 mounted in refining segment 1 having a refining surface) and comprises at least a first set of force sensors (*e.g.*, set of force sensors 12 or set of force sensors 22, shown in FIG. 7) for simultaneously measuring both the magnitude and direction of stress forces in the plane of the stress measuring member (*see*, *e.g.*, p.12 ¶ 0045 l.19 through p.13 l.4). The first set of force sensors comprises a first force sensor for measuring the stress forces in a first direction (*e.g.*, a pair of sensors 12 or 22 arranged opposite one another, as shown in FIG. 7 and as described on p.12 ¶ 0045 ll.5-22 and p.13 ¶ 0046 ll.7-15, for measuring the stress forces in the X-direction or the Y-direction, as illustrated in FIG. 4) and a second force sensor for measuring the stress forces in a second direction (*e.g.*, another pair of sensors 12 or 22 arranged opposite one another for measuring the stress forces in another direction), said first direction being angularly displaced with respect to said second direction (*see*, *e.g.*, p.12 ¶ 0045 ll.8-9), whereby the magnitude and direction of the stress forces in the plane of the stress measuring member are determined from the readings of each of the first and second force sensors (*see*, *e.g.*, p.13 ll.2-4).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 22, 24-32, and 34-42 are unpatentable under 35 U.S.C.§ 102(e) as being anticipated by U.S. Patent No. 6,840,470 to Bankes *et al.* ("*Bankes*").

VII. ARGUMENT

A. The Rejection Under 35 U.S.C. § 102(e) Over *Bankes* Is Improper

It is respectfully submitted that the § 102 rejection over *Bankes* should be reversed because *Bankes* does not meet all of the limitations of independent claims 22 and 30, and, consequently, also does not meet the limitations of the claims depending therefrom.

1. Claims 22 And 24-29

i. *Bankes* Does Not Measure Stress Forces In Two Different Directions In The Plane Of The Measuring Surface

Independent claim 22 recites, inter alia, "simultaneously measuring both the magnitude and direction of stress forces ***in the plane of said measuring surface***, wherein said simultaneously measuring comprises measuring said stress forces in a first direction by means of a first sensor and measuring said stress forces in a second direction by means of a second force sensor, said first direction being angularly displaced with respect to said second direction, and determining said magnitude and direction of said stress forces by measuring said stress forces in said first and second directions" (emphasis added). As is clearly required by the above-quoted claim language, the first and second directions (in which "said stress forces" are "simultaneously measure[ed]") are both "in the plane of said measuring surface."

The benefit of the above claimed feature is that it enables measurement of shearing forces in two directions, thus allowing both the magnitude and direction of the resulting shearing force to be determined in any direction in the plane of the measuring surface (*see* p.7 ¶ 0021). This aspect of the invention is further discussed in the specification:

> Said pairs of sensors are also arranged perpendicular to each other for measuring in an X-direction and a Y-direction, i.e. in a plane parallel with the measuring surface 2. This permits measurement of forces in all directions in a plane parallel with the measuring surface, the magnitude and direction of the force being determined as the resultant of the readings of respective pairs of force sensors (see also Figure 4).

(p.12 ¶ 0045 l.19 through p.13 l.4.)

The Official Action mailed December 13, 2007 ("Final Rejection"), contended that the above-described claimed feature is disclosed in *Bankes*. In support of this contention, language was quoted from the specification of *Bankes*:

> Use of at least two sensor elements will permit both shear and normal forces to be resolved" "when normal and shear forces are applied to the sensor head 32, reaction forces are developed at each of the piezo sensor element locations. An electric charge, proportional to the magnitude of the reaction force, is developed by each piezo sensor element 26. The applied normal and shear forces can be determined by measuring and processing the electric signals from each of the piezo sensor elements 26 using appropriate signal conditioning equipment and data analysis.

(Final Rejection 3 (*quoting Bankes* col.6 ll.54-55, col.12 ll.35-42).)

As is clear from the above-quoted passage, the forces being resolved in *Bankes* are shear and normal forces, where the normal force is not "in the plane of [the] measuring surface," as required by independent claim 22, but rather is <u>perpendicular to</u> the plane of the measuring surface. This fact follows from the nature of shear and normal forces, but it is also explicitly

stated in *Bankes*: "[a] single force sensor, or an array of force sensors, can be used to measure the magnitude of the normal force, acting perpendicular to the plane of the refiner bar surfaces, and the shear force, acting in the plane of the refiner bar surfaces." (*Bankes* col.14 ll.11-15.)

The present application makes clear that "stress forces in the plane of said measuring surface," as recited in independent claim 22, does not refer to normal forces directed perpendicularly to the measuring surface. This is evident from the claims, in view of the fact that dependent claims add limitations reciting "stress forces directed perpendicularly to said measuring surface" (*see, e.g.*, claims 26-28), and it is also evident from the specification (*see, e.g.*, p.13 ¶ 0049 ll.1-4).

Nowhere does *Bankes* disclose or suggest determining the magnitude and direction of stress forces "in the plane of said measuring surface" by measuring stress forces in two different directions in the plane of the measuring surface (i.e., in a "first direction . . . angularly displaced with respect to [a] second direction"), as recited by independent claim 22. In fact, in view of all of the disclosed embodiments of *Bankes*, *Bankes* only contemplates measuring shear force along one dimension. For example, referring to Figures 2, 3A, and 3B of *Bankes*, the four piezo electric sensor elements 26 are arranged to measure shear forces in one dimension parallel to the plane of the refining face 16 (i.e., in the left-right direction of FIG. 2). *Bankes* does not disclose or suggest, for example, arranging piezo electric sensor elements 26 at different locations in a plane parallel to the refining face 16 in order to measure stress forces in two different directions in the plane of the measuring surface and in order to determine the magnitude and direction of the stress forces in that plane. Instead, the entire disclosure of *Bankes* consistently teaches

the determination of one-dimensional shear and normal forces, where the shear force is measured in one dimension along the refining face 16 in a direction transverse to the refiner bars 22, and the normal force is perpendicular to the plane of the refining face 16.

Thus, *Bankes* cannot anticipate independent claim 22, or any of the claims depending therefrom, because, at the very least, *Bankes* does not meet the above limitation of claim 22.

ii. The Measuring Surface Of *Bankes* Does Not Include At Least A Portion Of At Least A Pair Of Bars

Bankes does not meet the limitation of claim 22 reciting "a measuring surface comprising a predetermined portion of said at least one refining surface including at least a portion of ***at least a pair of said plurality of bars***" (emphasis added). The benefit of this claimed feature is that the stress forces are measured over a relatively large surface, thereby producing a more reliable measurement.

The Final Rejection contended that the above claimed feature is disclosed in *Bankes*, stating that "Bankes discloses, 'In the above embodiments, a single force sensor or an array of force sensors can be employed.'" (Final Rejection 12 (*quoting Bankes* col.4 ll.47-48).) However, in all of the embodiments disclosed in *Bankes*, the force sensor includes a sensor head 32 which replaces a portion of one refiner bar or all of one refiner bar, and it has a profile matching that of the refiner bar. (*See, e.g., Bankes* col.3 ll.38-42, col.4 ll.1-2, col.6 ll.20-22, col.7 ll.13-16, col.8 ll.48-56, col.9 ll.39-43, and FIGS. 1-16.) The statement that "an array of force sensors can be employed," where each force sensor includes a sensor head 32 replacing a portion of one refiner bar or all of one refiner bar, cannot be considered to disclose a measuring surface "including at least a portion of ***at least a pair of . . . bars***"

(emphasis added). A sensor head 32 including a portion of at least a pair of refiner bars is not disclosed or suggested anywhere in *Bankes*. Instead, as stated above and as clearly described in the above-cited portions of *Bankes*, the "sensor head" of *Bankes* only includes a portion of one refiner bar or all of one refiner bar.

Thus, it is respectfully submitted that independent claim 22 is not anticipated by *Bankes* because, at the very least, *Bankes* does not meet all of the above-discussed limitations of the claim. *Bankes* similarly cannot anticipate dependent claims 24-29, at least due to the dependency of those claims from independent claim 22.

2. Claims 30-32 And 34-42

i. *Bankes* Does Not Measure Stress Forces In Two Different Directions In The Plane Of The Stress Measuring Member

Independent claim 30 recites, inter alia, "at least a first set of force sensors for simultaneously measuring both the magnitude and direction of stress forces ***in the plane of said stress measuring member***, wherein said first set of force sensors comprises a first force sensor for measuring said stress forces in a first direction and a second force sensor for measuring said stress forces in a second direction, said first direction being angularly displaced with respect to said second direction, whereby said magnitude and direction of said stress forces in said plane of said stress measuring member are determined from the readings of each of said first and second force sensors" (emphasis added). As is clearly required by the above-quoted claim language, the first and second directions (in which "said stress forces" are measured by "said first set of force sensors") are both "in the plane of said stress measuring member."

The above-quoted claim language is analogous to the similar claim language quoted from independent claim 22 in the previous section. The Official Action appears to have rejected the above limitation for the same reasons discussed above.

Applicant respectfully submits that *Bankes* does not disclose or suggest the above limitation for the same reasons asserted in the previous section with respect to claim 22. That is, nowhere does *Bankes* disclose or suggest determining the magnitude and direction of stress forces "in said plane of said stress measuring member" by using a first set of force sensors comprising at least two force sensors for measuring stress forces in <u>two</u> different directions <u>in the plane</u> of the stress measuring member.

ii. The Measuring Surface Of *Bankes* Does Not Include At Least A Portion Of At Least A Pair Of Bars

Bankes does not meet the limitation of claim 30 reciting, similar to independent claim 22 above, "a measuring surface comprising a predetermined portion of said at least one refining surface including at least a portion of ***at least a pair of said plurality of bars***" (emphasis added).

For the same reasons asserted in the previous section, Applicant respectfully submits that *Bankes* does not disclose or suggest the above claim limitation. That is, a sensor head 32 including a portion of at least <u>a pair</u> of refiner bars is not disclosed or suggested anywhere in *Bankes*.

Thus, it is respectfully submitted that independent claim 30 is not anticipated by *Bankes* because, at the very least, *Bankes* does not meet all of the above-discussed limitations of the claim. *Bankes* similarly cannot anticipate dependent claims 31-32 and 34-42, at least due to the dependency of those claims from independent claim 30.

VIII. CONCLUSION

For the reasons set forth above, this honorable Board should reverse the rejections of claims 22, 24-32, and 34-42.

Dated: December 9, 2008

Respectfully submitted,

By____________________

Arnold H. Krumholz
Registration No.: 25,428
LERNER, DAVID, LITTENBERG, KRUMHOLZ & MENTLIK, LLP
600 South Avenue West
Westfield, New Jersey 07090
(908) 654-5000
Attorney for Applicant

CLAIMS APPENDIX

22. A method of measuring stress forces in refiners including a pair of refining discs juxtaposed with each other and forming a refining gap for refining material therebetween, said pair of refining discs including at least one refining surface including a plurality of bars for refining said material within said refining gap, said at least one refining surface including a measuring surface comprising a predetermined portion of said at least one refining surface including at least a portion of at least a pair of said plurality of bars, said method comprising resiliently mounting said measuring surface in said at least one refining surface and simultaneously measuring both the magnitude and direction of stress forces in the plane of said measuring surface, wherein said simultaneously measuring comprises measuring said stress forces in a first direction by means of a first force sensor and measuring said stress forces in a second direction by means of a second force sensor, said first direction being angularly displaced with respect to said second direction, and determining said magnitude and direction of said stress forces by measuring said stress forces in said first and second directions.

24. The method of claim 22 wherein said simultaneously measuring comprises measuring said stress forces in a first direction by means of a first pair of first sensors disposed

opposite each other to provide counter-directed readings and measuring said stress forces in said second direction by means of a second pair of second sensors disposed opposite each other to provide counter-directed readings, said first pair of first sensors and said second pair of second sensors being disposed perpendicularly to each other.

25. The method of claim 22 wherein said simultaneous measuring includes compensating for eccentric normal stress forces on said measuring surface.

26. The method of claim 22 including measuring stress forces directed perpendicularly to said measuring surface.

27. The method of claim 26 wherein said measuring of said stress forces directed perpendicularly to said measuring surface includes combining the force exerted by steam pressure inside said refiner and the force exerted by fiber pressure from said refining material.

28. The method of claim 26 wherein said measuring of said stress forces directed perpendicularly to said measuring surface includes measuring the force exerted by fiber pressure from said refining material and compensating for the force exerted by steam pressure inside said refiner.

29. The method of claim 22 wherein said simultaneous measuring of both said magnitude and said direction of said stress forces in said plane of said measuring surface comprises calculating both said magnitude and direction from said first

and second force sensors, and including controlling said refining process based thereon.

30. Apparatus for measuring stress forces in refiners including a pair of refining discs juxtaposed with each other and forming a refining gap for refining material therebetween, said pair of refining discs including at least one refining surface including a plurality of bars for refining said material within said refining gap, said at least one refining surface including a stress measuring member comprising a measuring surface comprising a predetermined portion of said at least one refining surface including at least a portion of at least a pair of said plurality of bars, said stress measuring member being resiliently mounted in said at least one refining surface and comprising at least a first set of force sensors for simultaneously measuring both the magnitude and direction of stress forces in the plane of said stress measuring member, wherein said first set of force sensors comprises a first force sensor for measuring said stress forces in a first direction and a second force sensor for measuring said stress forces in a second direction, said first direction being angularly displaced with respect to said second direction, whereby said magnitude and direction of said stress forces in said plane of said stress measuring member are determined from the readings of each of said first and second force sensors.

31. The apparatus of claim 30 including compensating means for compensating for eccentric normal forces in said plane of said stress measuring member that will effect said measuring.

32. The apparatus of claim 30 including an additional stress measuring member for measuring stress forces perpendicular to said stress measuring member.

34. The apparatus of claim 30 wherein said first set of force sensors includes a pair of said first force sensors for measuring said stress forces in said first direction and a pair of said second force sensors for measuring said stress forces in said second direction.

35. The apparatus of claim 30 wherein said stress measuring member comprises a first body connecting said first set of force sensors to said stress measuring member, said first body comprising a first tubular resilient member disposed around the central axis of said stress measuring member, said first set of force sensors being disposed on said first tubular resilient member.

36. The apparatus of claim 30 wherein said stress measuring member includes a second set of force sensors.

37. The apparatus of claim 36 wherein said stress measuring member comprises a second body connecting said second set of force sensors to said stress measuring member, said second body comprising a second tubular resilient member disposed around the central axis of said stress measuring

member, said second set of force sensors being disposed on said second tubular resilient member.

38. The apparatus of claim 37 wherein said second set of force sensors and said second body comprise compensating means for compensating for eccentric normal forces.

39. The apparatus of claim 35 including an additional stress measuring member for measuring stress forces perpendicular to said stress measuring member, said additional stress measuring member comprising at least three force sensors disposed on said first tubular resilient member.

40. The apparatus of claim 37 including an additional stress measuring member for measuring stress forces perpendicular to said stress measuring member, said additional stress measuring member comprising at least three force sensors disposed on said second tubular resilient member.

41. The apparatus of claim 32 wherein said additional stress measuring member comprises means for measuring the stress force exerted perpendicular to said stress measuring member.

42. The apparatus of claim 30 wherein said first set of force sensors comprise strain gauges.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

None